

ACCESSION #: 9907140085

NON-PUBLIC?: N

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Joseph M. Farley Nuclear Plant Unit 2 PAGE: 1 OF 3

DOCKET NUMBER: 05000364

TITLE: Reactor Trip Due to Loss of Condenser Vacuum on Steam

Dump Drain Line Failure

EVENT DATE: 06/12/1999 LER #: 1999-001-00 REPORT DATE: 07/02/1999

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: L.M. Stinson TELEPHONE: (334) 899-5156

General Manager Nuclear Plant

COMPONENT FAILURE DESCRIPTION:

CAUSE: A SYSTEM: SB COMPONENT: PSP MANUFACTURER:

REPORTABLE EPIX: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

Unit 2 was manually tripped on June 12, 1999 at 2147 due to decreasing vacuum in the condenser. A steam dump drain line was found broken. Metallurgical analysis of the drain line determined that it had failed due to fatigue. Thermal growth of the main steam line relative to the drain line that was at ambient temperature created high stress points at several points on the drain line due to the supports not adequately allowing for this

growth. These high stress points included the location of the break.

During construction, installation of the steam dump drain lines was craft routed as allowed for by the applicable piping specification and quality control procedures. The piping specification did not require a stress analysis on small bore piping in the turbine building. Later in plant life, a binding problem was identified. In 1990 a design change was issued to correct the binding problem with the steam dump drain header that, due to personnel error, did not consider the most extreme service condition in the stress analysis. Therefore, the design change was inadequate in that it did not eliminate the overstress condition of the drain line which contributed to a fatigue failure of the pipe.

The broken section of line was replaced. Several supports were modified to relieve the stress in the drain header. Engineering review of the new configuration by design personnel has determined it to be acceptable to operate until the next refueling outage. An additional design change, to further reduce the stress on the drain operate until header and the steam dump drain lines, will be implemented during the next refueling outage. The corresponding piping on Unit 1, which is configured differently than Unit 2, has been visually examined, and no indication of excessive stress due to binding was detected.

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Westinghouse -- Pressurized Water Reactor

Energy Industry Identification Codes are identified in the text as [XX].

#### Description of Event

On June 12, 1999 at approximately 2143 with Unit 2 at 100% power, the turbine condenser vacuum low annunciator alarmed. The control room operators sent personnel to investigate and started a turbine load reduction in accordance with appropriate plant procedures. At 2147, following the receipt of the turbine condenser vacuum low-low alarm, the reactor was manually tripped in accordance with the abnormal operating procedure for loss of condenser vacuum. Following the trip the source range detectors [IG], N-31 and N-32, failed to automatically reenergize due to a loss of compensating voltage on intermediate range detector [IG],

N-35. Therefore, in accordance with plant procedures, the plant operators manually energized the source range detectors. All other automatic functions responded correctly.

Investigation determined the Unit 2 steam dump [SB] drain line failed downstream of the steam dump line drain valve "C," associated with steam dumps "E" and "F," resulting in decreasing vacuum in the condenser.

An opportunity to correct this problem was missed in 1990. In 1988 a binding problem was identified at the turbine building floor penetration for the steam dump drain header. A design change was implemented in 1990 to correct the binding situation. The design change was inadequate in that the stress analysis did not consider the most extreme service condition. Therefore, the design change did not eliminate overstress of the drain line which contributed to fatigue failure.

#### Cause of Event

Metallurgical analysis of the drain line determined that it had failed due to fatigue. Thermal growth of the main steam line [SB] relative to the drain line that was at ambient temperature created high stress points at several points on the drain line due to the supports not adequately allowing for this growth. These high stress points included the location of the break.

During construction, installation of the steam dump drain lines was craft routed as allowed for by the applicable piping specification and quality control procedures. The piping specification did not require a stress

analysis on small bore piping in the turbine building. Later in plant life, a binding problem was identified. In 1990 a design change was issued to correct the binding problem with the steam dump drain header that, due to personnel error, did not consider the most extreme service condition in the stress analysis. Therefore, the design change was inadequate in that it did not eliminate the overstress condition of the drain line which contributed to a fatigue failure of the pipe.

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#### Safety Assessment

The health and safety of the public were unaffected by this event. No release of radioactivity occurred, and all protective functions occurred as required. In addition, the failure of the intermediate range detector N-35 compensating voltage was appropriately mitigated by manually energizing the source range detectors.

#### Corrective Action

The broken section of line was replaced. Several supports were modified to allow movement of the drain header. An engineering review, which included a stress review of the new configuration, determined that it is acceptable to operate until the next refueling outage. A bi-weekly preventive maintenance task has been implemented to perform visual and acoustical observations of this piping until the next Unit 2 refueling outage.

An additional design change to further reduce the stress on this and other

steam dump drain lines will be implemented during the next Unit 2 refueling outage.

Corresponding steam dump piping on Unit 1 has been visually examined, and no indication of excessive stress due to binding was detected. Following the removal of insulation at the supports, additional inspections will be performed on the Unit 1 steam dump drain lines. Utilizing the inspection results, the existing stress analysis will be reviewed and changes will be implemented as appropriate before the end of the next Unit 1 refueling outage.

The appropriate design individuals will be trained on this event by August 31, 1999.

#### Additional Information

The following LERs were submitted in the last two years involving design-related events due to personnel errors:

LER 98-006-00 (Unit 1) Penetration Room Filtration System Suction Damper Outside Design and Licensing Basis; and

LER 97-012-00 (Shared) Foreign Material in Emergency Recirculation Sumps and As-Found Configuration Discrepancies.

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